

General Remarks

Before addressing the issues raised by the examiner related to specific claims, we believe that it may be useful to discuss the differences between our submission and the prior art cited by examiner.

Clark's patent discloses the signal combining matrix being $W = \begin{bmatrix} 1 & j \\ j & 1 \end{bmatrix}$. This matrix performs well, in situations where the antenna geometry is ideal and unchanging and the propagation channel consists of single unchanging ray. However in real environments, especially in point to point communication applications, antennas are often mounted on high masts where the antennas are in motion (due to wind, etc.). This motion, which could be on the order of several wavelengths per second, results in a rapidly changing phase of the propagation channel which necessitates the fast modification of the restorer's combining coefficients. What is more, any indirect path (for example caused by ground reflections) will cause a varying frequency selective fading, necessitating the introduction of coefficients processing past samples of received mixtures. These issues are not answered in Clark's disclosure as Clark claims adaptation only in conjunction with systems having two orthogonal polarizations of electromagnetic waveforms i.e. his adaptation objective is, presumably to cancel the cross-polarization remainder signal. As opposed to Clark's disclosure our cancellation algorithm or combining matrixes may be varying in time and, in the general case, the combining signal elements may contain time delay components (i.e. coefficient which are using mixture samples from the past). We are respectfully asking the examiner to consider this as a significant improvement over the state of the prior art.

The Dabak's patent describes a system which uses channel propagation estimation in order to facilitate closed and open loop adaptation of a diversity CDMA system. His method is directed towards enhancing CDMA systems, as opposed to ours, which, in one implementation, uses a low level spread spectrum signal and cancels this additional signal thereby leading to the cancellation of the interfering signal in order to facilitate the adaptation of our receiver, restoring the original set of transmitted signals. The Dabak patent adaptation objectives and therefore calculation of error and adaptive filters structures have no similarity to our disclosure. In view of the above differences, we respectfully submit to the examiner that none of Dabak's methods are obviously transferable to our system.

Also, we would like to emphasize that using adaptive structures for signal restoration was not obvious for inventors. Firstly, they had to recognize the problems discussed above i.e. the problems connected with single and constant combining method. Secondly, extensive simulations were necessary in order to convince ourselves that optimized configuration of antennas will continue constructively add the wanted signal while canceling unwanted signals in the "real environment". Thirdly, in order to conduct these simulations the inventors had to develop suitable adaptive structures and adaptive algorithms. Finally, the inventors had to confirm the simulations by measurements.

Specific Remarks

Per claim 1, the examiner points out that Clark discloses a communication system, which contains many of the elements which are included in our claim. However, in the claims of Clark's patent, Clark always claims a system which is optimized to operate in an ideal environment. With Clark's single constant combining matrix, his system will only work in ideal and unchanging environments and we have therefore invented an adaptive system,

including means to enable it to operate in real environments. We are respectfully asking the examiner to consider this as a significant improvement. While we did include the adaptivity features in subsequent dependent claims, we now propose that this claim is reworded in order to include some of these subsequent dependent claims. Please see the attached revised claim 1. The inventors therefore believe that the examiners objection has been adequately addressed.

Same arguments apply, *mutatis mutandis*, to claim 18 and 29.

Per claim 2, this claim has been removed.

Claim 19 has also been removed.

Per claim 3, this claim has been removed.

Claim 20 has also been removed.

Per claim 4, this dependent claim refers to independent claim 1, rather than dependent claim 3. The scope of the claim is now narrower, including the adaptivity feature. The inventors therefore believe that the examiner's objection has been fully and adequately overcome.

Per claim 5, this dependent claim refers to independent claim 1, rather than dependent claim 3. The scope of the claim is now narrower, including the adaptivity feature. Similarly to the above, the inventors believe that the examiner's objection has been fully and adequately overcome.

Per claim 7, this dependent claim now refers to independent claim 1. This claim is meant to suggest a way to facilitate the adaptation of the adaptive receiver, the adaptation

being a necessary condition of claim 1. While Clark's system is indeed using signal pauses, as the examiner correctly indicates, his combining matrix remains substantially constant. Because of this difference, the inventor's feel that the examiner's objection has been addressed.

Same arguments apply, *mutatis mutandis*, to claim 22.

Per claim 10, this claim has been removed.

Per claims 16 and 17, these claims have been removed.

Per claim 23, this defendant claim covers a method for adapting the adaptable receiver's parameters, in the reworded claim 18. By modeling the channel propagation, our filters are adaptive (varying in time) and may combine past data samples. As such, this claim is substantially different than Clark's disclosure. Because of these differences, the inventor's feel that the examiner's objection has been addressed.

Same arguments apply, *mutatis mutandis*, to claim 32.

Per claim 24, this defendant claim covers a method for adapting the adaptable receiver's parameters, in the reworded claim 18. The same arguments apply to those discussed in "per claim 23".

Same arguments apply, *mutatis mutandis*, to claim 30.

Per claim 25, this claim has been removed.

Per claim 31, with all due respect, the references cited by the examiner appear to be directed towards the removal of interference caused by the use of diversity signals. The claims including diversity systems have been removed from this patent application. This claim is

different from Clark's since his main combining matrix is constant, and is not adapted during pauses. Therefore, the inventors believe that, by pointing out the above differences, the examiner's objection has been answered.

Same arguments apply, *mutatis mutandis*, to claims 34 and 36.

Per claim 6, this has been made dependent on claim 1 and refers to a method which could be used in order to estimate the parameters of the propagation channel, which could then be used to adjust the adaptive receiver. The inventors would like to point out to the examiner that this is only one of the methods which could be used to adjust the adaptive receiver's parameters. The inventors would also like to respectfully point out, that we are not, in the amended claims, using closed loops at all. Because of these differences and points made in the "General remarks", regarding obviousness, the inventor's believe that the amendments will address the examiner's objections.

Same arguments apply, *mutatis mutandis*, to claims 21, 32.

Per claim 35, which has been made dependent on claim 29, refers to another method to adapt the restorer in the adaptable receiver. The inventor's feel that the Dabak patent adaptation objectives and therefore calculation of error and adaptive filters structures have no similarity to our disclosure. The inventors submit that the examiners objection has been addressed by this discussion.

Per claim 8, this dependent claim has been removed.

Per claim 33, this claim describes yet another method for adjusting the parameters of the restorer in the adaptive receiver. The inventors would like to point out that ours is not a

CDMA system, and also, Dabak does not include the use of pilot tones. The inventors believe that this discussion has addressed the examiners objection.

Per claim 9, this dependent claim has been removed.

Per claim 11, while Dabak is describing the limited mutual interference properties of the individual signals making up a typical CDMA signal, our intention of claim 11 is to outline the use of a pilot tone, for channel estimation purposes, which is overlaid on the transmitted data signal, and is adjusted in phase in such a way that it does not interfere with the actual data (the zero crossings of the overlaid pilot tone would be designed to coincide with instants corresponding to the data samples). The inventors believe that this explanation has addressed the examiners objection.

Same arguments apply, *mutatis mutandis*, to claims 26 and 27.

Per claim 12, as with claim 11, Dabak is describing the limited mutual interference properties of the individual signals making up a typical CDMA signal, and our intention with claim 12 is to use spread spectrum signals, due to their low level of interference, as signals which could be used, without causing excessive interference to the data signal, to facilitate the adjustment of the adaptable receiver's restorer. The inventor's feel that the Dabak patent adaptation objectives and therefore calculation of error and adaptive filters structures have no similarity to our disclosure. The inventors submit that the examiners objection has been addressed by this discussion.

Per claim 13, 28, 14, and 15 have been removed since our system has been specialized in that it must contain an adaptable receiver.

We have considered the patent application (U.S. 2001/0004585) by Tsujimoto. For his proposed invention, Tsujimoto is relying on operations which are performed prior to signal transmission. We have removed any claims, directed towards transmitter operations from our application.

We have also considered the patent application (U.S. 2003/0114108) by Frecassetti et al. Similar to Tsujimoto's application, he is relying on operations which are performed prior to signal transmission. We have removed any claims, directed towards transmitter operations, from our application.

In order to include the prior art indicated by the examiner, we propose the addition of the attached paragraph to the "Background Of the Invention" section. We believe that it should be inserted before paragraph #0006.

The inventors are enclosing amended claims. Deletions to the claims have been crossed out, with additions being underlined. Also, while some of the claims have been removed, the remaining claims have not been renumbered, so as not to affect the validity of the US Patent Office's "office action" and the inventor's response. The inventors would be agreeable to submit a renumbered version if simply requested.

In view of the above remarks and the attached amendments to the claims, it is expected that this application is in a condition for allowance.

Respectfully submitted,

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President, Creative Signal Solutions Inc.

Date

Ken Scott, inventor
Chief Technology Officer, Creative Signal Solutions Inc.

Date

Enclosure:

- 1. Amendments to the "CLAIMS"
- 2. Amendments to "BACKGROUND OF THE INVENTION"